The invention is applicable to folder inserters for preparing mail. The inverter makes it possible to use a very simple conveyor for coupling the outlet of a printer in a word processor system to the inlet of a folder-inserter, even though the printer outputs printed pages in an order that is unsuitable for direct insertion into envelopes. The inverter includes a read/write memory in which the sequence of binary words representing the text of a letter is stored as it is output by the word processor system, with the address of the beginning of each page of text being identified. These binary words are played back, page by page, with the pages being played back in inverted order of text pages, but with the characters making up the pages being played back within each page in their initial order. The invention is applicable to folder-inserters for preparing mail.
ELECTRONIC PAGE INVERTER FOR A
MAIL PROCESSING SYSTEM, AND A
FOLDER-INSERTER INCLUDING SUCH AN
INVERTER

FIELD OF THE INVENTION

The invention relates to an electronic page inverter for a
mail processing system comprising:
a simple word processor system constituted, for example,
by a CRT screen, a keyboard, a central unit, and a
sheet-fed printer; and
at least one folder-inserter enabling the sheets of a letter
to be placed in an envelope.

BACKGROUND OF THE INVENTION

When the system is small and produces a small quantity
of letters, the printer is generally not mechanically coupled
to the folder-inserter. Transfer is performed manually.
The user takes the sheets at the outlet from the printer and inserts
them in an inlet of the folder-inserter. Two types of printer
need to be distinguished: some printers provide the sheets on
which a letter has been printed in an order suitable for
enabling the sheets to be inserted directly into an envelope.
Other printers provide the sheets in an order that is unsuitable
for direct insertion in an envelope since the address
would find the last page in front of the first page. The user
must therefore not only transfer the sheets manually, but
must additionally change the order of the sheets.

To make such a system of mail handling more practical,
the outlet of the printer could be mechanically coupled to the
inlet of the folder-inserter. However, such mechanical coupling
must solve the problem of inverting page order if the
printer already owned by the user does not provide pages in
the proper order for direct insertion in an envelope. A
mechanical page inverter could be associated with the
printer, such as described in European patent applications EP
0 365 283 and EP 0 398 187, however such mechanical
devices are difficult to fit to an already-existing printer that
a user does not want to change because of the cost of such
a change.

OBJECT AND SUMMARY OF THE INVENTION

The object of the invention is to enable transfer to be
performed automatically between a printer and a folder-
inserter, when the printer is of the type that provides the
pages of a letter in an order that is not suitable for direct
insertion in an envelope, without requiring the entire printer
to be changed, and without requiring major mechanical
modifications to be made, and without requiring a change of
word processor software.
The present invention provides an electronic page inverter
for a mail processing system comprising:
a word processor system;
a sheet-fed printer;
means for electrically coupling the printer to said word
processor system; and
a folder-inserter mechanically coupled to the printer to:
receive the sheets on which the printer has printed the
text of a letter; to fold said sheets; and to insert them in
an envelope;
wherein the means for coupling the printer to the word
processor system include means for storing a sequence of
binary words representing a letter as said sequence
is output by the word processor system, with the
beginning of each page of text being identified; and for
playing back said binary words page by page with
pages being played back in inverted order, but with the
characters making up each page being played back in
the initial order.

A simple mail processing system that would otherwise
have required pages to be transferred manually from the
printer to the folder-inserter, and to be inverted manually,
can thus be made more practical with the inverter as defined
above since a simple mechanical device now suffices to
couple the output of the printer to the input of the folder-
inserter, page inversion being performed without using any
mechanical device, but by using an electronic device which
is very cheap to implement, and which is very easy for an
unspecialized user to connect between the word processor
system and the printer.
The invention also provides a folder-inserter including an
inverter of the invention. Such a folder-inserter enables a
user who already possess a word processor system and a
printer that provides sheets in an order that is not suitable for
direct insertion, nevertheless to implement a more sophis-
ticated mail treatment system by adding a folder-inserter
fitted with said inverter, thereby solving the problem due to
the sheets being in reverse order.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood and other char-
acteristics will appear from the following description and the
accompanying figures, in which:

FIG. 1 is a diagram of a mail processing system including
an embodiment of the inverter of the invention;
FIG. 2 shows printed sheets output by the printer of said
mail processing system when the page inverter is not in
operation; and
FIG. 3 shows the printed sheets output by the printer of
said system when the inverter of the invention is in opera-
tion.

MORE DETAILED DESCRIPTION

This embodiment comprises: a word processor system 1
constituted by a CRT screen 11, a central unit 12, and a
keyboard 13; a printer 2; a conveyor 3; a folder-inserter 4;
and an electronic page inverter 5.
The central unit 12 and the printer 2 include respective
standardized input/output connectors that, in the prior art,
are designed to be connected together directly. In the
invention, these two connectors are connected to respective
connectors of the inverter 5. Another connector of the
inverter 5 is connected to a connector of the folder-inserter
4, which is a conventional model.

FIG. 2 shows four sheets F1, . . . , F4 on which the printer
2 has printed four pages of a letter, the sheets being marked
PAGE1, . . . , PAGE4. FIG. 2 shows what happens when the
central unit 12 is directly connected to the printer 2, either
via a prior art link or else because the inverter 5 is out of
operation. The sheets F1, . . . , F4 stack up successively
with their printed faces uppermost, such that the last page, PAGE
4, is the first page presented to a user for reading. This order
is unsuitable for direct insertion in an envelope.

FIG. 3 shows four sheets F1', . . . , F4' on which the printer
2 has printed the four pages of a letter, but in this case the
inverter 5 has been in operation. It can be seen that the sheets
F1', . . . , F4' are stacked successively in that order and that
they still have the printed face on top, however the first page
of text, PAGE1, has been printed on sheet F4'. Consequently,
the pages can be read in the order of increasing page number without there being any need to permute page order. The pages can therefore directly inserted in an envelope by means of a conveyor which is very simple since it is not required to invert page order.

In this embodiment, the inverter comprises:

- a microprocessor associated with a read only memory containing the operating program of the inverter;
- a read/write memory of sufficient capacity to store a text that is 64 pages long, for example;
- input/output interfaces connected, in particular, to the connectors of the inverter which are in turn linked to the central unit, to the printer, and to the folder inserter;
- a display device, optionally provided with a buzzer to warn the user when the number of pages stored by the inverter exceeds a predetermined threshold value, said display being connected to one of the outputs of the interfaces;
- a bus interconnecting the microprocessor, the interface, and the memories and.

The printer includes an outlet slot which is connected to a register containing the start of the last page of the letter. To read each of the characters of this page in their initial order, the microprocessor uses a second pointer referred to as a character address pointer, which pointer is loaded with the start-of-page address as found in the register pointed to by the first pointer. The second pointer is then incremented as characters are printed by the printer.

The end of each page is marked by the character or character string marking the beginning of the following page, or by the character string marking the end of the series of pages.

When the microprocessor detects that this special character or character string has been read in the memory, it stops incrementing the second pointer and it decrements the first point by unity. This process is reiterated until the microprocessor detects that the first pointer has reached the first page, and that the special character or character string indicating the end of the first page has been read and detected.

When all of the pages of a letter have been printed, the printer provides a signal indicating that it is again ready, and the inverter deduces that it can start an operating cycle of the folder inserter providing the folder inserter is supplying a signal indicating that it is ready. The inverter thus also acts as a coordinator for the word processor, the printer, and the folder inserter.

When all of the pages of a letter have been printed, the printer can warn the user by means of the display and optionally by means of a buzzer, in the event of an anomaly, e.g. too many pages relative to a threshold value corresponding to the maximum value acceptable by the folder inserter, or in the event that the printer fails to give a ready signal.

In a variant embodiment, the inverter is not implemented in a stand-alone housing, but it is incorporated in the folder inserter.

What is claimed is:

1. An electronic page inverter for a mail treatment system, the mail treatment system comprising a word processor system for redacting the text of a letter, a sheet-fed printer for printing the pages of the letter, and a folder inserter mechanically coupled to the printer for receiving sheets on which the printer has printed the pages of the text, folding said sheets, and inserting them in an envelope, the inverter comprising:

   - input/output interfaces connected to the word processor system, the sheet-fed printer and the folder inserter;
   - means for recording a sequence of binary words representing the alphanumeric characters of the letter as they are delivered by the word processor system;
   - means for inserting in the sequence of binary words a first control code at the beginning of each page of the letter, and a second control code at the end of the last page of the letter;
   - means for recognizing said first and second control codes in the recorded sequence of binary words for the purpose of playing back said recorded binary words to the printer, letter page by letter page in inverse order of letter pages from the last page to first page while keeping the characters making up each page in their initial order; and
   - means for starting an operation cycle of the folder inserter when all of the pages of the letter have been printed.

2. An electronic page inverter according to claim 1, wherein said means for recording a sequence of binary words comprises a first pointer to point in succession to
registers containing start-of-page addresses and a second pointer which is implemented as characters are printed by the printer.

3. An electronic page inverter according to claim 1, further comprising means for recognizing in said recorded sequence of binary words third and fourth control codes for bringing into operation or for taking out of operation the inverter respectively.

4. An electronic page inverter according to claim 1, further comprising an alarm device to warn the user of the mail treatment system in the event of an anomaly.

5. A folder inserter for co-operating with a word processor system and a sheet-fed printer of a mail treatment system, said folder inserter being mechanically coupled to the printer and being electronically coupled to the word processor system and to the printer by an electronic page inverter according to claim 1 which is incorporated in said folder inserter.

6. A folder inserter for co-operating with a word processor system and a sheet-fed printer of a mail treatment system, said folder inserter being mechanically coupled to the printer and being electronically coupled to the word processor system and to the printer by an electronic page inverter according to claim 2 which is incorporated in said folder inserter.

7. A folder inserter for co-operating with a word processor system and a sheet-fed printer of a mail treatment system, said folder inserter being mechanically coupled to the printer and being electronically coupled to the word processor system and to the printer by an electronic page inverter according to claim 3 which is incorporated in said folder inserter.

8. A folder inserter for co-operating with a word processor system and a sheet-fed printer of a mail treatment system, said folder inserter being mechanically coupled to the printer and being electronically coupled to the word processor system and to the printer by an electronic page inverter according to claim 4 which is incorporated in said folder inserter.

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